Yue Xin

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SUMMARY

Research Interests: My research primarily lies in machine learning, interpretable AI, and computer vision. My goal is to identify the fundamental optimization goal of deep learning and construct interpretable machine learning systems through mathematical derivations. Specifically, I aim to establish objective metrics to measure model performance and mathematically deduce the factors that contribute to model performance, guiding the design of neural network architectures.

Highlight: 4 years of programming experience; 3 years of research experience with solid mathematical and theoretical background.

Relevent Courses: A(90+) for all math/physics related courses(Calculus, Physics, Probability and Statistics, etc) and most major related courses(Signals and Systems, Progamming, Optoelectronics, etc). A+(95+) for most major related experimental courses(Engineering Problem Modeling and Simulation, Engineering Practice and Technological Innovation).

EDUCATION

Shanghai Jiao Tong University (SJTU) **June 2023 – Present**

M.S. in Information and Communication Engineering *Shanghai, China*

- Adversor: Prof. Hongkai Xiong and Prof. Wenrui Dai

Shanghai Jiao Tong University (SJTU) **Sep 2019 – June 2023**

B.S. in Electronic Science and Technology (major) and Computer Science and Technology (minor) *Shanghai, China*

- Grades for All Courses: 89.66/100 GPA for All Courses: 3.85/4.3

PUBLICATIONS

- **Why Adversarial Training of ReLU Networks Is Difficult?**
  Xu Cheng*, Hao Zhang*, **Yue Xin**, Wen Shen, Jie Ren, Quanshi Zhang.
  AAAI, 2024. [paper]

ACADEMIC RESEARCH EXPERIENCE

Institute of Media, Information and Network(min), SJTU **Nov 2022 – Present**

Machine Learning and Computer Vision Intern and Master's Student *Advisor: Hongkai Xiong, Wenrui Dai*

- Utilized various techniques and selected the best one (Chebyshev polynomials) to fit the activation functions in DNNs.
- Developped implicit-layer networks to accelarate optimization convergence.
- Embedded the fitted polynomial activation functions into implicit-layer networks to improve performance while enhance the interpretability of the network. (Preparing submission for ICML 2024)

Interpretable ML lab, SJTU **Feb 2022 – Nov 2022**

Interpretable Machine Learning Intern *Advisor: Quanshi Zhang*

- Used high-dimensional matrix analysis to clarify the challenges in adversarial training. (Accepted by AAAI 2024)
- Derived the dynamics characteristics in interactive learning. (Preparing for submission)
- Designed experimental methods to analyze the robustness of various complexity concepts.

SunnyLab, SJTU **Mar 2021 – May 2022**

Machine Learning and Computer Vision Intern *Advisor: Chongyang Zhang*

- Developped Swin Transformer based model to implemente instance segmentation of workpiece welding area.
- Designed a space-time filter to remove false positive samples in pedestrian detection.
- Developped YOLOv5-based model to detect tower crane, recognize dangerous tower crane, and label electronic fence.

ACADEMIC COMPETITION (Selected)

The 20th Chinese Graduate Mathematical Modeling Competition: ***Nation level, Second Prize*** **2023**

The Mathematical Contest in Modeling: ***World level, Meritorious Winner (First Prize)*** **2021**

The Huawei Cloud 'Cloud Pioneers' Few-Shot Detection Competition: ***Nation level, Third Place*** **2021**

The 12th National College Student Mathematical Competition: ***City level, First Prize*** **2020**

The 2nd National 'August 1st Cup' Online Mathematics Competition: ***Nation level, Tenth Place*** **2020**

PROJECT (Selected)

CS368: Digital Image Processing Course Final Project | *Python, Pytorch* **Oct 2021 – Feb 2022**

Implemented multi-object tracking and behavior recognition for soccer players using algorithms like ByteTrack, YOLOv5, and Kalman filtering, with file Transfer and visualized recognition results using Qt.

AI005: Deep Learning Practical on Huawei AI Platform Competition | *Python, Pytorch* **Oct 2021 – Feb 2022**

Secured the third place nationwide in the 'Cloud Pioneers' competition on Huawei Cloud by successfully completing the few-shot detection task.

EE458: Software Engineering Course Final Project | *Python, Pytorch, Java* **Sep 2021 – Jau 2022**

Trained a YOLOv5 model on a face mask dataset and deployed it on mobile devices for real-time mask detection.

TECHNICAL SKILLS

Programming Languages: Proficient in Python, C++, Matlab, LaTeX, Linux, etc.

Frameworks: Proficient in PyTorch, NumPy, Anaconda, Git, OpenCV.

Mathematics: Proficient in calculus, linear algebra, probability statistics, etc.

Language: mandarin (native), English (fluent)

HONORS & AWARDS (Selected)

Outstanding Undergraduate Graduate of Shanghai Jiao Tong University ***University level, 5%*** **2023**

National Scholarship ***Nation level, 2%*** **2021**

Shanghai Jiao Tong University A-Class Excellent Scholarship for Undergraduate ***University level, 2%*** **2021**

Shenzhen Stock Exchange Scholarship ***University level, 2%*** **2020**

Shanghai Jiao Tong University B-Class Excellent Scholarship for Undergraduate ***University level, 5%*** **2020**